HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Klickitat Spring Chinook Production Program- Klickitat Hatchery
Species or Hatchery Stock	Chinook Salmon *(Oncorhynchus tshawytscha)*
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Klickitat River, Columbia Gorge
Date Submitted	nya
Date Last Updated	August 15, 2004

Section 1: General Program Description

1.1 Name of hatchery or program.

Klickitat Spring Chinook Production Program- Klickitat Hatchery

1.2 Species and population (or stock) under propagation, and ESA status.

Klickitat Spring Chinook Salmon

ESA Status: Not listed and not a candidate for listing

1.3 Responsible organization and individuals.

Name (and title):	Richard Johnson
	Washougal-Skamania Hatcheries Complex Manager
Agency or Tribe:	Washington Department Fish and Wildlife
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
Yakama Tribe	Technician

1.4 Funding source, staffing level, and annual hatchery program operational costs.

Funding Sources
Mitchell Act

Operational Information	Number
Full time equivalent staff	5.0
Annual operating cost (dollars)	$587,000
The above information for full-time equivalent staff and annual operating cost applies cumulatively to Anadromous Fish Programs conducted at Klickitat Hatchery and cannot be broken out specifically by program.	

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Klickitat Hatchery/RKm 68/ Klickitat River
Broodstock collection location (stream, RKm, subbasin)	Klickitat Hatchery/RKm 68/ Klickitat River
Adult holding location (stream, RKm, subbasin)	Klickitat Hatchery/RKm 68/ Klickitat River
Spawning location (stream, RKm, subbasin)	Klickitat Hatchery/RKm 68/ Klickitat River
Incubation location (facility name, stream, RKm, subbasin)	Klickitat Hatchery/RKm 68/ Klickitat River
Rearing location (facility name, stream, RKm, subbasin)	Klickitat Hatchery/RKm 68/ Klickitat River

1.6 Type of program.

Integrated Harvest/Conservation - (Mid and Lower Columbia River)

The proposed integrated strategy for this program is based on WDFW's assessment of the genetic characteristics of the hatchery and local natural population, the current and anticipated productivity of the habitat used by the populations. 100% marking of yearlings and fingerlings began with brood year 2002. Starting in brood years 2006 and 2007, WDFW and the Yakama Tribe will be able to identify integration of natural origin recruits (NOR) for the program.

1.7 Purpose (Goal) of program.

- Rear and release 600,000 yearling spring chinook smolts into the Klickitat River.
- Produce spring chinook salmon to help mitigate for fish losses in the Columbia River Basin for hydropower activities within the Columbia River Basin that have decreased salmonid populations.
- The spring chinook program is important as a source of fish for tribal mitigation programs. The goal is to provide production to sustain tribal Zone 6 fisheries, sport and tribal fisheries at the mouth of the Klickitat River, in-river sport fisheries, and mixed stock ocean fisheries.
- Establish spring chinook in the upper watershed by introducing adult spawning cohorts and up to 300,000 sub-yearling spring chinook. .
- Approximately 500 eyed eggs go to WDFW Regional Co-ops for education purposes.

1.8 Justification for the program.

- The spring Chinook production program is funded through the Mitchell Act via NMFS for the purpose of mitigation for lost fish production due to development within the Columbia River Basin. The "Mitchell Act" (Act) (Public Law 75-502) was passed in 1938.
- Federal Court Decisions (US vs. Oregon and US vs. Washington) ruled that Indian Tribes who signed treaties with the federal government in the 1850's have treaty rights to harvest a share (50%) of surplus fish resources.
- Yakima/Klickitat Fisheries Project (YKFP or Project)
- Pacific Northwest Electric Power Planning and Conservation Act.
- U.S. v Oregon court agreements.
- Columbia River Fisheries Development Program
- Columbia River Fish Management Plan

- By the end of 2004, the Klickitat Hatchery and facilities will be transferred to the Yakima/Klickitat Fisheries Project (YKFP or Project) which is a supplementation project designated by the Northwest Power Planning Council's (NWPPC) as the principal means of protecting, mitigating, and enhancing the anadromous fish populations in the Yakima and Klickitat subbasins. The Klickitat portion of the Project's production and research activities will be brought on-line in stages. The first phase includes the supplementation of Klickitat spring chinook and steelhead. This initial phase also includes production of coho and fall chinook designed to enhance harvest to meet treaty obligations and provide fishing opportunities for non-tribal fishers. At present, the Project does not operate a fish production facility in the Klickitat Subbasin. The proposal is designed to address future activities including operation and maintenance of Lyle Falls Facility (broodstock collection, video monitoring); Castile Falls Fishway; and the Klickitat Hatchery for spawning, incubation, rearing, and acclimation/release of spring chinook and steelhead.

In order to minimize impact on listed fish by WDFW facilities operation and the Klickitat spring chinook program, the following Risk Aversion are included in this HGMP:

Table 1. Summary of risk aversion measures for the Klickitat Coho program.

Potential Hazard	**HGMP Reference**	**Risk Aversion Measures**
Water Withdrawal	4.2	Water rights are formalized thru trust water right S4-*07272 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	WDFW has requested funding for future scoping, design, and construction work of a new river intake system to meet NOAA compliance (Mitchell Act Intake and Screening Assessment 2002).
Effluent Discharge	4.2	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) - WAG 13-5002.
Broodstock Collection & Adult Passage	7.9	The hatchery weir and associated intake facilities need repairs to provide compliant passage.
Disease Transmission	7.9, see also 10.11	*Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).
Competition & Predation	See also 2.2.3, 10.11	Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish.

1.9 List of program "Performance Standards".

See section 1.10

1.10 List of program "Performance Indicators", designated by "benefits" and "risks".

1.10.1 Benefits:

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Assure that hatchery operations support Columbia River fish Mgt. Plan *(US v Oregon)*, production and harvest objectives.	Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Achieve a 10-year average of 0.23 % smolt-to-adult survival that includes harvest plus escapement (range 0.08-0.62%) (1380 fish at current production levels).	Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock need.
Maintain outreach to enhance public understanding, participation and support of Washington Department of Fish & Wildlife (WDFW) hatchery programs.	Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the facility to better understand hatchery operations. Off station efforts may include festivals, classroom participation, stream adoptions and fairs.	Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program. Record on-station organized education and outreach events.
Program contributes to fulfilling tribal trust responsibility mandates and treaty rights	Follow pertinent laws, agreements, policies and executive and judicial orders on consultation and coordination with Native American tribal governments	Participate in annual coordination meetings between the co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process).
Implement measures for broodstock management to maintain integrity and genetic diversity. Maintain effective population size. Maximize available Natural Origin Broodstock (NOB).	A minimum of 500 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. (WDFW 1983) Adhere to WDFW stock transfer guidelines. (WDFW 1991)
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	Use mass-mark (adipose-fin clip) for selective fisheries with additional groups (Ad+CWT) and (CWT only) for evaluation purposes as needed.	Returning fish are sampled throughout their return for length, sex, and mark.
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens.	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy.
	Inspection of adult broodstock for parasites and pathogens.	At spawning, lots of 60 adult broodstock are examined for pathogens.
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens.	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.

1.10.1 Risks:

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Minimize impacts and/or interactions to ESA listed fish.	Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (10 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. Mass mark production fish to identify them from naturally produced fish (except CWT only groups).	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, instream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented.
Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed.
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance WDFW water right permit compliance.	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and instream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities.	WDFW completes an HGMP and is issued a federal and state permit when applicable.	Identified in HGMP and Biological Opinion for hatchery operations.
Harvest of hatchery-produced fish minimizes impact to wild populations.	Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	Harvests are monitored by agencies and tribes to provide up to date information..

1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

500 adults at 1:1 female to male ratio.

1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Fingerling	300000	60	May – August	Klickitat	RKm 102	Klickitat	Columbia Gorge
Yearling	600000	14	March	Klickitat	RKm 68	Klickitat	Columbia Gorge

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Brood Year	Smolt to Adult Survival (%)	Return Year	Total Catch (all ages)	Spawning Ground Escapement	Hatchery Escapement
1990	0.08	1990	nya	54	574
1991	0.19	1991	nya	113	534
1992	0.29	1992	nya	686	635
1993	0.09	1993	51	660	1789
1994	0.01	1994	33	201	629
1995	0.14	1995	104	277	484
1996	0.54	1996	209	1340	574
1997	0.10	1997	239	309	829
1998	0.62	1998	55		313
1999		1999	57		458
		2000	402		746
		2001	415		350

1.13 Date program started (years in operation), or is expected to start.

The first year of operation for this hatchery was 1951 .

1.14 Expected duration of program.

The program is on-going with no planned termination.

1.15 Watersheds targeted by program.

Klickitat Subbasin/Columbia Gorge Province

1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

1.16.1 Brief Overview of Key Issues:

Beginning in 1951 with native stock and has been continued to be propagated using volunteer returns to Klickitat Hatchery trap. Need to adjust the NOR/HOR proportion and that would reduce genetic risk, maybe utilizing Lyle Falls trap. Continue to mass mark all fish released at hatchery location. Mass marking began with brood year 2000 with approximately 50% being marked, brood years 2001, 2002 were 100% mass marked this will help in determining NOR/HOR proportion returning to hatchery trap.

1.16.2 Potential Alternatives to the Current Program:

Alternative 1: To adjust NOR/HOR proportions to reduce genetic risk, the need to continue to mass mark 100% hatchery release and to utilize Lyle Falls trap along with hatchery trap.

Alternative 2: With utilization of Lyle Falls trap, take NOR adults and transport to hatchery for incubation and initial rearing then acclimate at upper Klickitat River acclimation sites.

1.16.3 Potential Reforms and Investments:

Reform/Investment 1: Construct Lyle Falls trap in lower river $$$$.

Reform/Investment 2: Development of acclimation sites in upper watershed for NOR portion of program. No cost estimate available.

The hatchery program is a part of a strategy to meet conservation and/or harvest goals for the target stock. The tables below indicate what the short- and long-term goals are for the stock in terms of stock status (biological significance and viability), habitat and harvest. The letters in the table indicate High, Medium, or Low levels for the respective attributes. Changes in these levels from current status indicate expected outcomes for the hatchery program and other strategies (including habitat protection and restoration).

	Biological Significance	Viability	Habitat
Current Status	H	H	H
Short-term Goal	H	H	H
Long-term Goal	H	H	H

Section 2: Program Effects on ESA-Listed Salmonid Populations

2.1 List all ESA permits or authorizations in hand for the hatchery program.

Program is described in the Biological Assessment For The Operation Of Hatcheries Funded by The National Marine Fisheries Service (March 99), Statewide Section 6 consultation with USFWS for interactions with Bull Trout, and concurrent with this HGMP to satisfy Section 7 consultations: WDFW is writing HGMP's to cover all stock/programs produced at Lower Columbia and Mid-Columbia hatcheries. For Klickitat this will include; fall chinook, spring chinook and coho released from Klickitat hatchery and summer steelhead (off-station stream plant).

2.2 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

The following ESA listed natural salmonid populations occur in the subbasin where the program fish are released:

ESA listed stock	Viability	Habitat
Summer Steelhead-Natural	L	L
Winter Steelhead-Natural	L	L
Bull Trout – Natural	Unknown*	L
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		
* WDFW (SaSI 1998)		

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

Identify the ESA-listed population(s) that will be <u>directly</u> affected by the program
No NMFS ESA listed populations will be directly affected by this program.

Identify the ESA-listed population(s) that may be <u>incidentally</u> affected by the program
Middle Columbia River Steelhead March 19, 1998; 64 FR 14508.
Columbia Basin DPS Bull Trout June 10, 1998 (63 FR 31647), Threatened.

2.2.2 Status of ESA-listed salmonid population(s) affected by the program.

Middle Columbia River Steelhead *(Oncorhynchus mykiss*) March 19, 1998; 64 FR 14508, Threatened. Within the Middle Columbia River Steelhead ESU, hatchery STHD stocks from outside the ESU are imported and released into the White Salmon (Skamania Hatchery winter and summer steelhead), Klickitat (Skamania Hatchery winter and summer steelhead) and Walla Walla (Lyons ferry), The BRT concluded that the Middle Columbia steelhead ESU is not presently in danger of extinction, but reached no conclusion regarding its likelihood of becoming endangered in the foreseeable future. All BRT members felt special concern for the status of this ESU and concluded that NMFS should carefully evaluate conservation measures affecting this ESU and continue monitoring its status. Winter steelhead are reported within this ESU only in the Klickitat River and Fifteenmile Creek; we have no abundance information for winter steelhead in the Klickitat River, but they have been declining in abundance in Fifteenmile Creek.

The current status of summer and winter run steelhead in the Klickitat River is not known. These runs are believed to be native to the system. Lack of funding and the inherent difficulty conducting population surveys in this river contribute to the current lack of knowledge. The

Yakama Nation has conducted population surveys in the Klickitat River to gather information on steelhead; they've conducted spawning ground surveys in a limited number of tributaries in the basin and operated a couple of downstream smolt traps. The Yakama Nation (YN) estimated an annual escapement of 260 steelhead per year based on spawning ground survey data collected from 1996 to 2000 (NMFS 2000a). These spawning ground surveys cover less than 50 percent of the available spawning habitat for steelhead in the Klickitat River basin (B. Sharp, YN, pers. comm.). Results from the smolt traps are insufficient to make any productivity conclusions. The trap placements in the river were not effective for catching fish. The YN is currently relocating the smolt traps to more efficient trapping locations (MCRM FMEP 2003).

Columbia Basin DPS Bull Trout June 10, 1998 (63 FR 31647), Threatened.
The Fish and Wildlife Service issued a final rule listing the Columbia River and Klamath River populations of bull trout *(Salvelinus confluentu*s) as a threatened species under the Endangered Species Act on June 10, 1998 (63 FR 31647). The Columbia River Distinct Population Segment is threatened by habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, and past fisheries management practices such as the introduction of nonnative species. The Lower Columbia Recovery Unit Team identified two core areas (Lewis and Klickitat rivers) within the recovery unit. The Klickitat Core Area includes all tributaries downstream to the confluence with the Columbia River. Recent evidence indicates both resident and adfluvial bull trout may be present in the basin. In 1998, CRITFC tribal pikeminnow gillnetters reported capturing two bull trout at the river's mouth. In May 2000, an additional bull trout recovery and release was reported at the Pikeminnow Sport-reward Registration Station at the river's mouth. Photographic evidence of fish angled in the mid-1980s are of a size associated with adfluvial populations. Additional survey work will be conducted in the upper drainage to determine the distribution and abundance of bull trout in the subbasin. In the 1995 Amendment to the 1994 Columbia River Basin Fish and Wildlife Program (10.5A.6), the Northwest Power Planning Council recognized the importance of studying bull trout in the Klickitat system, with particular attention to determining presence and abundance of juveniles and adults, comparing genetic makeup with other regional stocks, determining available habitat and limiting factors and developing a management plan. The YN, in conjunction with the WDFW, will conduct a cooperative study investigating the Klickitat River bull trout population(s). Field studies will determine stock(s) status and life history patterns present, through presence/absence investigations, population estimates, habitat analysis and genetic DNA analysis. The abundance and distribution of the stock is poorly known. There are insufficient data to make an assessment. However, it appears that there are very few bull trout in the lower- to mid-Klickitat drainage. Bull trout appear to be more abundant in the upper drainage where habitat conditions are more favorable. Four bull trout up to 10 inches in length were observed during snorkel surveys in the upper mainstem (RM 64, above the West Fork) and 23 bull trout (three to seven inches in length) were observed during electrofishing surveys in Trappers Creek. Portions of the West Fork upstream of Fish Lake Stream contain an isolated naturally reproducing population of bull trout. We do not know the impacts of hatchery salmon and steelhead in the main Klickitat River on bull trout/Dolly Varden. Generally, in drainages colonized by anadromous salmon and steelhead, char successfully co-exist by occupying a different ecological niche.

2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.

Broodstock Program

Broodstock Collection: Broodstock are volitionally collected for this program at the Klickitat Hatchery from May to September. No listed fish mortalities have been observed during this

operation for the past nine years (Ron Ballard, WDFW pers. Comm. 2004). No take is associated with this activity.

Genetic introgression: This stock is of native origin that has been is sustained by Klickitat hatchery production since at least 1988. A comprehensive electrophoretic analysis of genetically distinct stocks of all species and races of salmon and steelhead in the Klickitat was conducted between 1989 and 1994 (Busack 1990). This analysis indicated that hatchery and naturally spawning Klickitat spring chinook were genetically indistinguishable. Starting with 2006 adult returns, brood will be identifiable as to hatchery or natural origin fish. Straying level is unknown, but the program fish are reared, acclimated and imprinted to fingerling and/or yearling smolt stage at this facility and directed harvest occurs on this mass marked program. Indirect take is unknown.

Rearing Program

Operation of Hatchery Facilities: Water rights are formalized through trust water right S4-*07272 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports. Intake structures were designed and constructed to specifications at the time the Klickitat facility was constructed. The Mitchell Act Intake and Screening Assessment (2002) has identified design and alternatives needed to get existing structures in compliant including intake screens and velocity sweeps which are not in compliant with NOAA fish screening standards. From the assessment, WDFW has been requesting funding for future scoping, design, and construction work of a new intake system. This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). WAG 13-5002. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. Discharges from the cleaning treatment system are monitored as follows: *Total Suspended Solids (TSS)*C1 to 2 times per month on composite effluent, maximum effluent and influent samples. *Settleable Solids (SS)*C1 to 2 times per week on effluent and influent samples. *In-hatchery Water Temperature* - daily maximum and minimum readings. Indirect take for listed species is unknown from operation of the hatchery facility.

Disease: Outbreaks in the hatchery may cause significant adult, egg, or juvenile mortality. Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the programs at Klickitat Hatchery. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994) Chapter 5 have been instrumental in reducing disease outbreaks. Fish are planted and transferred after a fish health specialist has determined the population health. Indirect take from disease are unknown.

Release Program

Hatchery Production/Density-Dependent Effects: Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can compete with listed fish. Planting of Klickitat Hatchery spring Chinook occurs in March. Fish are released at a time, size and condition factor that indicates a high level of smolting and are expected to emigrate quickly to minimize density-dependent effects on listed fish. Indirect take from density dependent effects is unknown.

Competition: Salmon and steelhead feed actively during their downstream migration (Becker 1973; Muir and Emmelt 1988; Sager and Glova 1988) and if they do not migrate they can compete with wild fish. WDFW is unaware of any studies that have empirically estimated the

competition risks to listed species posed by the program described in this HGMP. Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition:

1. As discussed above, coho salmon and steelhead released from hatchery programs as smolts typically migrate rapidly downstream. The SIWG (1984) concluded that "migrant fish will likely be present for too short a period to compete with resident salmonids." On station release in large systems may travel even more rapidly – migration rates of approximately 20 river miles per day were observed by steelhead smolts in the Cowlitz River (Harza 1998).
2. NMFS (2002) noted that ".where interspecific populations have evolved sympatrically, chinook salmon and steelhead have evolved slight differences in habitat use patterns that minimize their interactions with coho salmon (Nilsson 1967; Lister and Genoe 1970; Taylor 1991). Along with the habitat differences exhibited by coho and steelhead, they also show differences in foraging behavior. Peterson (1966) and Johnston (1967) reported that juvenile coho are surface oriented and feed primarily on drifting and flying insects, while steelhead are bottom oriented and feed largely on benthic invertebrates."
3. Flagg et al. (2000) concluded, "By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource". Thus, the modern enhancement strategy of releasing salmon and steelhead trout as smolts markedly reduces the potential for hatchery and wild fish to compete for resources in the freshwater rearing environment. Miller (1953), Hochachka (1961), and Reimers (1963), among others, have noted that this potential for competition is further reduced by the fact that many hatchery salmonids have developed different habitat and dietary behavior than wild salmonids." Flagg et al (2000) also stated "It is unclear whether or not hatchery and wild chinook salmon utilize similar or different resources in the estuarine environment."
4. Fresh (1997) noted that "Few studies have clearly established the role of competition and predation in anadromous population declines, especially in marine habitats. A major reason for the uncertainty in the available data is the complexity and dynamic nature of competition and predation; a small change in one variable (e.g., prey size) significantly changes outcomes of competition and predation. In addition, large data gaps exist in our understanding of these interactions. For instance, evaluating the impact of introduced fishes is impossible because we do not know which nonnative fishes occur in many salmon-producing watersheds. Most available information is circumstantial. While such information can identify where inter- or intra specific relationships may occur, it does not test mechanisms explaining why observed relations exist. Thus, competition and predation are usually one of several plausible hypotheses explaining observed results."
5. Studies from Fuss (2000) on the Elochoman River and Riley (2004) on two Willapa Bay tributaries (Nemah and Forks Creek), indicate that hatchery reared coho and chinook can effectively leave the watersheds within days or weeks.

Predation (Freshwater): Spring chinook yearlings from this program may prey upon listed species of salmonids, but the magnitude of predation will depend upon the characteristics of the listed population of salmonids, the habitat in which the population occurs and the characteristics of the hatchery program (e.g.. release time, location, number released and size of fish at release). The site specific nature of predation and the limited number of empirical studies that have been conducted, make it difficult to predict the predation effects of this specific hatchery release. WDFW is unaware of any studies that have empirically estimated the predation risks to listed fish posed by the Klickitat Hatchery programs. In the absence of site-specific empirical information, the identification of risk factors can be a useful tool for reviewing hatchery programs while monitoring and research programs are developed and implemented.

Predation Risk Factors:

Environmental Characteristics: These characteristics can influence the level of predation (see SIWG 1984 for a review) with risk greatest in small systems during periods of low flow and high clarity. The Klickitat River system is large and one of the longest un-dammed rivers in the Northwest, approximately 95 miles in length. Glacially fed, flows are high in spring and mid-summer with glacial till reducing visibility. Yearly flows range from a low of approximately 500-800 cfs in early fall to a high of 2000-5000 cfs in the winter and during runoff (USGS Real Time Data 2004).

Dates of Releases: The release date can influence the likelihood that listed species are encountered. For spring chinook released in March, listed steelhead would emerge later in the spring and are not present at that time. Summer and winter steelhead in the Klickitat spawn from early March through early June (SaSI 2002). Depending on available temperature units, eggs will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching which indicates listed fish are not available until late April to early July. Fingerling releases upriver will remain in the upper system for another year and could interact with list steelhead.

Relative Body Size: Studies and opinions on size of predator/prey relationships vary greatly and although there is evidence that salmonids can prey upon fish up to 50% of their body length, most prey consumed is probably much smaller. Keeley and Grant (2001) suggest that the mean prey size for 100-200 mm fl salmonids is between 13-15% of predator body size. Salmonid predators were thought to be able to prey on fish up to approximately 1/3 of their length (USFWS 1994), although coho salmon have been observed to consume juvenile chinook salmon of up to 46% of their total length in aquarium environments (Pearsons et al. 1998). Artic char are well known as piscivorous predators, but recent studies suggest the maximum prey size is approximately 47% of their length (Finstad et al. 2002). The "33% of body length" criterion for evaluating the potential risk of predation in the natural environment has been used by NOAA Fisheries and the USFWS in a number of biological assessments and opinions (c.f., USFWS 1994; NMFS 2002). Although predation on larger chinook juveniles may occur under some conditions, WDFW believes that a careful review of the Pearson and Fritts (1999) study supports the continued use of the "33% of body length criterion" until further species data for the Klickitat River can be collected.

Release Location and Release Type: The likelihood of predation may also be affected by the location and the type of release. Other factors being equal, the risk of predation may increase with the length of time that fish co-mingle. In the freshwater environment, this is likely to be affected by distribution of the listed species in the watershed, the location of the release and the speed at which fish released from the program migrate. Coho salmon and steelhead released from western Washington artificial production programs are in a smolted condition and have typically been found to migrate rapidly downstream. Data from Seiler et al. (1997; 2000) indicate that coho smolts released from the Marblemount Hatchery on the Skagit River migrate approximately 11.2 river miles per day. Steelhead smolts released onstation may travel even more rapidly – migration rates of approximately 20 river miles per day have been observed in the Cowlitz River (Harza 1998). The current release location is at RKm 68.0, however WDFW and the Yakama Tribe are exploring options for lower river sites (RKm 36.0) for acclimation and release.

We have provided a summary of empirical information and a theoretical analysis of competition and predation interactions that may be relevant to the plant of spring chinook to the Klickitat River.

Potential Klickitat River spring Chinook predation and competition effects on listed

salmonids: The proposed annual production goal for this program is up to 600,000 yearlings and 200-300,00 sub-yearlings.

The yearlings are released as active smolts during March and are unlikely to encounter listed steelhead in the subbasin and Columbia mainstem. Past releases were targeted at 8.0-10 fpp (167-155 mm fl). Future releases will be released at 10-14 fpp (139-155 mm fl). Competition with listed steelhead fingerlings would be unlikely due to life stage differences and the habitat occupied. Predation on steelhead fry is thought to be minimal as the release occurs in advance of most steelhead emergence. Competition with listed steelhead smolts would be unlikely as both stocks would be actively migrating. Smoltification and outmigration of listed steelhead are believed to occur in April and May, peaking in early May (Draft Klickitat Subbasin Plans 2000). At 10.0 fpp (155 mm fl), potential predation on listed fish, if encountered, would be on fish of 51 mm fl and smaller. Little information is available on listed steelhead juvenile life histories specific to this watershed; timings are inferred from those of stocks in the Lower Columbia River although summer and winter steelhead in the Klickitat spawn from early March through early June (SaSI 2002). Depending on available temperature units, eggs will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching which indicates listed fish are not available until late April to late June. Below are approximate swim up time lines for the Lower Columbia steelhead ESU.

Table 2. Lower Columbia Steelhead Spawn and Emergence Windows.

Race	Spawn Time	Peak Spawn Window	Incubation to Hatch	Swim-up Window	Swim-up @ 50% Date	Source
Winter	March – May	April 15 - 25th	May 13 – June 15	May 27-July 7	June 17	LCSI Draft 1998
Summer	Februar y April	March 20-30th.	April 14 – May 18	April 28 – June 2	May 15	Kalama River Research Report 2003

The river above Castile Falls (RKm 102) receives sub-yearling fish in mid-summer. Most will emigrate from the system by fall. Fish that end up downstream can encounter listed steelhead in the basin. Spring chinook released in May are approximately 70 fpp (approximately 82 mm fl) while those planted later in August can reach 30 fpp (109 mm fl). Competition with first of the year listed fish (fry) would be possible due to life stage similarities or habitat occupied. Predation on emerging steelhead is unlikely though due to the size of the spring chinook sub-yearlings and the size of listed steelhead at emergence and their growth through August. Listed steelhead would have to be 36 mm fl or less at that time. Competition with listed steelhead non-smolts is unknown but considerable habitat exists in total on the Klickitat system up to and beyond Castile Falls (up to McCormick Meadow (RKm 140.0)) which is less than 0.5 % gradient. Indirect take from predation and competition is unknown.

Residualism: To maximize smolting characteristics and minimize residualism, WDFW adheres to a combination of acclimation, volitional release strategies, size, and time guidelines. For fingerling releases in the upper watershed, habitat is available for spring chinook productivity (EDT) to smolt sizes the following spring. For the yearling smolted program:

- Condition factors, standard deviation and co-efficient of variation (CV) on lengths of fish are

measured through out the rearing cycle and at release.

- Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize size variations and reprogrammed as needed to achieve goals for smolt size at time of release.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimated ponds.
- Releases from these ponds are volitional with large proportions of the populations moving out initially with the remainder of the population vacating within a couple of days.
- Minimal residualism from WDFW coho programs following these guidelines has been indicated from snorkeling studies on the Elochoman River (Fuss 2000). In extensive surveys conducted on the Lewis River, Hawkins and Tipping (1999) found no residualized hatchery spring chinook. Indirect take due to residualism is unknown.

Migration Corridor/Ocean: Smolts are released in mid-March to correspond with a period of high spill over Bonneville Dam. It is unknown to what extent listed fish are available both behaviorally or spatially on the migration corridor. Once in the main stem, Witty et al. (1995) has concluded that predation by hatchery production on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor. There appear to be no studies demonstrating that large numbers of Columbia system smolts emigrating to the ocean affect the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in the ocean. Indirect take in the migration corridor or ocean is unknown.

Monitoring:

Associated monitoring and evaluation and research programs: The WDFW received funding to install and operate a fish trap on the number 5 fishway at Lyle Falls, located at RM 2.2 on the Klickitat River. The fish trap was installed in the spring of 2003 and will be operated for two fiscal years, ending in 2005. This trap will provide WDFW with much needed data on escapement of salmon and steelhead into the Klickitat River. These data will provide the beginning of a database WDFW will use for fisheries management. The Yakama Nation (YN) conducts annual spawning ground surveys in index streams in the Klickitat River basin and operates two smolt traps to determine productivity. However, the spawning ground surveys cover less than 50 percent of the available spawning habitat in the basin and the efficiency of the smolt traps is not optimal (B. Sharp YN, pers. comm.). The YN is expanding the spawning ground surveys to cover more of the basin and relocating the smolt traps to more productive trapping locations. Data are not available to accurately estimate annual escapement or basin productivity. Scientific protocols are followed to limit impact on these activities. Additional concerns would be communicated to NOAA staff for adaptive management. Indirect take from these activities is unknown.

Spring chinook fisheries are open some years in Drano Lake and in the White Salmon, Klickitat, and Yakima Rivers. Both summer and winter steelhead occur in the Klickitat River. The status of these stocks is not known. The river presents many problems when it comes to estimating abundance for steelhead, such as seasonal high flows, turbid water, and access limitations. These conditions require extra effort to gather data needed to estimate steelhead abundance in the Klickitat River. Annually, WDFW develops and presents proposals to potential funding groups for monitoring and surveying activities. The WDFW has submitted proposals to groups such as BPA, Yakima Klickitat Fisheries Project, and NMFS. The WDFW will continue to seek funding for projects in the Klickitat River that will help to estimate steelhead abundance.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program

(e.g. capture, handling, tagging, injury, or lethal take).
In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. (See Take Tables at the end of this document for identified levels).

No listed steelhead have been documented entering the trap facility for the prior nine years according to staff.

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.
Any mortality from this operation or other Klickitat Hatchery operations would be communicated to Fish Program staff for additional guidance. For other listed species, if significant numbers of wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist who, along with the complex manager, would determine an appropriate plan and consult with NOAA for adaptive management review and protocol.

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.
No data available.

Section 3: Relationship of Program to Other Management Objectives

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

For ESU-wide hatchery plans, the plant of spring chinook into the Klickitat River is consistent with:

- 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin
- 1999 Review of Artificial Production of Anadromous and Resident Fish in the Columbia River Basin
- Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994)
- The *U.S. v. Oregon* Columbia River Fish Management Plan
- NWPPC Fish and Wildlife Program
- Yakima/Klickitat Fisheries Project (YKFP or Project)
- Klickitat Subbasin Anadromous Fishery Master Plan

For statewide hatchery plan and policies, hatchery programs in the Columbia system adhere to a number of guidelines, policies and permit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. Following is a list of guidelines, policies and permit requirements that govern WDFW Columbia hatchery operations for the production of spring chinook for the Klickitat River:

Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington. These guidelines define practices that promote maintenance of genetic variability in propagated salmon.. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

Spawning Guidelines for Washington Department of Fisheries Hatcheries. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be use to maintain genetic variability within the hatchery populations.

Stock Transfer Guidelines. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

Fish Health Policy in the Columbia Basin. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Policy Chapter 5, IHOT 1995).

National Pollutant Discharge Elimination System Permit Requirements This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired.

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

The program described in this HGMP is consistent with the following agreements and plans:

- The Columbia River Fish Management Plan
- Klickitat Subbasin Anadromous Fishery Master Plan
- Yakima/Klickitat Fisheries Project (YKFP or Project)
- U.S. vs. Oregon court decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife Wild Salmonid Policy

3.3 Relationship to harvest objectives.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

A Federal court decision in 1969 (*U.S. vs. Oregon*) ruled that Columbia River Treaty Tribes who signed treaties with the federal government in the 1850s are entitled to half of all harvestable salmon and steelhead destined for the tribes' traditional fishing grounds. This court decision mandated fisheries management cooperatively in a government-to-government relationship between the states of Oregon and Washington and the treaty Indian tribes.

All WDFW-regulated anadromous fisheries in the Mid Columbia River Region (MCMA) Fish Management and Evaluation Plan (FMEP March 2003) are conducted in cooperation with the parties of U.S. vs. Oregon. U.S. v. Oregon/Columbia River Compact.

U.S. v. Oregon/Columbia River Compact fisheries Technical Advisory Committee impact assessments are evaluated through Section 7/10 consultation process. Commercial fishery seasons on the portion of the mainstem Columbia River where the states of Oregon and Washington share a common boundary are regulated by a joint Oregon and Washington regulatory body (the Columbia River Compact). Meetings are held in late January of each year to establish the harvest guidelines for the spring and summer fisheries and in late July to establish guidelines for fall commercial and sport fisheries.

A recent (1995-98 Brood Years) estimate of the Klickitat spring chinook harvest rate in ocean, mainstem and in-basin fisheries is 28 percent. Escapement accounts for 72 percent of the total survival. This stock is managed to provide adequate escapement to the Klickitat Hatchery (Klickitat Sub-basin Plans 2000). (See also Section 1.12 above). Spring chinook returns to the Klickitat provide an important early component of fishing opportunity for tribal fishers.

The *U.S. v. Oregon* Columbia River Fish Management Plan recognized the importance of tribal harvest in the Klickitat River by mandating releases of 4.0 million fall chinook and 3.85-million coho in the river annually since 1988 in addition to the spring chinook program. With these releases, sales of chinook and coho have provided a steady contribution to tribal commercial fisheries, with sales to licensed commercial fish buyers averaging nearly 1,500 fall chinook and 2,000 coho annually since 1989 (Table 3). In addition to this harvest, Yakama Nation fisheries staff estimate that another 1,000 to 3,000 chinook, 500 to 2,500 coho, and 200 to 500 steelhead

are harvested annually by tribal fishers and either sold directly to the public or taken home for subsistence use (Klickitat Sub-basin Plans 2000).

Return Year	Total Catch (all ages)
1990	nya
1991	nya
1992	nya
1993	51
1994	33
1995	104
1996	209
1997	239
1998	55
1999	57
2000	402
2001	415

3.4 Relationship to habitat protection and recovery strategies.

The program described in this HGMP is consistent with the following habitat and protection strategies:

Yakama Nation Fisheries Program (YNFP):
The Lower Klickitat Riparian and In-Channel Habitat Enhancement Project is a BPA-funded watershed restoration project implemented by the Yakama Nation Fisheries Program (YNFP). The YNFP is working in coordination with WDFW, Natural Resources Conservation Service (NRCS), and the Central Klickitat Conservation District. The project was proposed under the Northwest Power Planning Council's Fish and Wildlife Program and funded by BPA in 1997. Initial project restoration projects were located within the Swale Creek and Little Klickitat River watersheds. Included in the project scope of work are in-stream structural modifications, re-vegetation of the riparian corridor, construction of sediment retention ponds to provide late-season flow to the creek and exclusion fencing to prevent channel degradation from livestock. A monitoring program has been initiated to document project success and guide future restoration activities. The second phase of the project will use EDT modeling output to guide and prioritization restoration activities.

Subbasin Planning and Salmon Recovery:
The current Klickitat program HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Draft Klickitat Sub-Basin Summary May 17, 2002) is a broad-scale initiative that will provide building blocks of recovery plans for listed fish and may well use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals.

Habitat Treatment and Protection:
WDFW and others are conducting, or have conducted, habitat inventories within the Klickitat

subbasin. Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. It creates a model to predict fish population outcomes based on habitat modifications. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP), which documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis:
A WRIA 30 (Klickitat Basin) habitat limiting factors report (LFA) has been completed by the Washington State Conservation Commission. This limiting habitat factors analysis was conducted pursuant to RCW 75.46 (Salmon Recovery). The purpose of this analysis was "to identify the limiting factors for salmonids" where limiting factors are defined as "conditions that limit the ability of habitat to fully sustain populations of salmon." It was intended that a locally based habitat project selection committee use the findings of this analysis to prioritize appropriate projects for funding under the state salmon recovery program. This analysis may also be used by local organizations and individuals interested in habitat restoration to identify such projects (Washington State Conservation Commission 2000).

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the Klickitat spring chinook program and are taken from the Puget Sound listed and non-listed HGMP template (WDFW and NOAA 2003).

(1) Salmonid and non-salmonid fishes or species that could negatively impact the program: Klickitat spring chinook smolts can be preyed upon through the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays along the Columbia mainstem sloughs can predate on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that can take a heavy toll on migrating smolts (river otters), and returning adults include: harbor seals, sea lions and Orcas.

(2) Salmonid and non-salmonid fishes or species that could be negatively impacted by the program: Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted thru a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. See also Section 2.2.3 Predation and Competition.

3) Salmonid and non-salmonid fishes or other species that could positively impact the program. Multiple programs including URB chinook spring chinook, coho and steelhead programs are released in this system and limited natural production of chinook, coho, and steelhead occurs in this system along with numerous non-salmonid fishes (sculpins, lampreys and sucker etc.).

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. A host of freshwater and marine species that depend on salmonids as a nutrient and food base

may be positively impacted by program fish. The hatchery program may be filling an ecological niche in the freshwater and marine ecosystem. A large number of species are known to utilize juvenile and adult salmon as a nutrient and food base (Groot and Margolis 1991; and McNeil and Himsworth 1980). Wild co-occurring salmonid populations might be benefited as hatchery fish migrate through an area. The migrating hatchery fish may overwhelm predator populations, providing a protective effect to the co-occurring wild populations. Pacific salmon carcasses are also important for nutrient input back to freshwater streams (Cederholm et al. 1999). Successful or non-successfully spawner adults originating from this program may provide a source of nutrients in oligotrohic coastal river systems and stimulate stream productivity. Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). The Klickitat River drainage is thought to be inadequately seeded with anadromous fish carcasses and steelhead carcasses can be used throughout the basin. Assuming integrated spawning and carcass seeding efforts, approximately 100 – 500 spring Chinook adult carcasses could contribute approximately 1,000 – 5,000 pounds of marine derived nutrients to organisms in the Klickitat river. *Saprolegniasis* occurrences in young hatchery fish have been observed in greater frequency on Mitchell Act stations that have nutrient enhancement projects and in some cases, circumstantial evidence suggests more outbreaks of gill and tail fungus are the result of nutrient enhancement efforts. Staff is continuing to monitor observations or occurrences of this possibility

Section 4. Water Source

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.

Spring water from Indian Ford A springs and pumped river water supply most of the water for this program, although there are several non-fish bearing streams on the grounds that could be used. Indian Ford springs provide up to 10,000 gpm of good quality water at 48 –52 degree F. The pumped river intake supplies up to 4000 gpm of river water. Spring water is used for the incubation and early rearing of all juveniles. In the spring, river water is introduced for acclimation for this pond. Fish can be reared in pond 26 located across the river, which is supplied with spring water from Wonder Springs, approximately one-half mile downstream and across the river from the main hatchery.

Adult spring chinook used as broodstock in this program are captured at the Klickitat Hatchery on the Klickitat River, which is the natal water source for the target population. The water flowing into the holding pond and trap is re-use rearing water from the hatchery and is made up primarily of spring water from Indian Ford A, which originates across the river from the hatchery. This is the same spring water, which is used for the incubation and early rearing of all juveniles. Approximately 60% of the yearling production is reared in pond 26 (Wonder Springs pond) through the final winter and spring, which is supplied with spring water from Wonder Springs approximately one-half mile downstream and across the river from the main hatchery. These water sources naturally flow into the Klickitat River and make up a part of its total volume, however they were not historically available as separate spawning/rearing waters.

4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Potential Hazard	Risk Aversion Measure
Hatchery water withdrawal	Water rights total 6000 – 8000 gpm from the gravity intake with another 4,000 pumped from the river. Water rights are formalized thru trust water right S4-*07272 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports
Intake/Screening Compliance	Intake structures were designed and constructed to specifications at the time the Klickitat facility was constructed. The Mitchell Act Intake and Screening Assessment (2002) has identified design and alternatives needed to get existing structures in compliant including intake screens and velocity sweeps which are not in compliant with NOAA fish screening standards. From the assessment, WDFW has been requesting funding for future scoping, design, and construction work of a new intake system .
Hatchery effluent discharges. (Clean Water Act)	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). WAG 13-5002. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. Discharges from the cleaning treatment system are monitored as follows: *Total Suspended Solids (TSS)*C1 to 2 times per month on composite effluent, maximum effluent and influent samples. *Settleable Solids (SS)*C1 to 2 times per week on effluent and influent samples. *In-hatchery Water Temperature* - daily maximum and minimum readings.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

The Klickitat Hatchery trap is located adjacent to the Klickitat River and is sited at the top of a fish ladder. Water supplied to the adult holding pond, trap and fish ladder is re-use hatchery rearing water which is diverted for the purpose of attracting adults returning to the hatchery. No physical barrier exists preventing fish from migrating further upstream past the hatchery. All adults entering the fish ladder and trap do so as volunteers. The trap has a "V" entry and fish entering are prevented from returning to the river. The upper gate in the trap is maintained in a closed position, being opened only when counting fish into the holding pond. The holding pond measures 40' x 60' x 4' deep and is divided down the middle into two sections used for sorting the fish during handling and spawning.

5.2 Fish transportation equipment (description of pen, tank, truck, or container used).

NA

5.3 Broodstock holding and spawning facilities.

All adults voluntarily entering the trap are held till maturity in the adult holding pond. These fish are inoculated up to three times during holding with Erythromycin to retard BKD. All fish are spawned directly from the holding pond and resulting eggs are fertilized and transported to the hatchery building. Each female is sampled for BKD levels and the resulting eggs are incubated separately until ELISA results are known.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Concrete	12000	40	60	4	1200

5.4 Incubation facilities.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
FAL	154	80	NA	4000	6500

5.5 Rearing facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
11	concrete	3500	100	10	3.5	250	nya	nya
1	Hypolon Release Pond	29925	190	45	3.5	55	nya	nya
1	earthen release pond	24500	175	40	3.5	6000	nya	nya

5.6 Acclimation/release facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
11	concrete	3500	100	10	3.5	250	nya	nya
1	Hypolon Release Pond	29925	190	45	3.5	55	nya	nya
1	earthen release pond	24500	175	40	3.5	6000	nya	nya

5.7 Describe operational difficulties or disasters that led to significant fish mortality.

None reported for this program.

5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Potential Hazard	Risk Aversion Measure
Equipment failure/Water loss	Multiple water sources are available. There is a main river gravity water feed system, three torpedo type river pumps, and several springs available. Backup generator system is automatic in case of power loss.
Flooding/Water Loss	The facility is sited so as to minimize the risk of catastrophic fish loss from flooding and set up with low water alarm probes in strategic locations to prevent loss due to loss of water. Alarm systems are monitored 24/7 with staff available on station to respond to problems.
Disease Transmission	IHOT fish health guidelines are followed. WDFW Fish Health Specialists conduct inspections monthly and problems are managed promptly to limit mortality and reduce possible disease transmission.

Section 6. Broodstock Origin and Identity

6.1 Source.

Broodstock used in the program are trapped from the run at large reaching the Klickitat Hatchery. Since the adults enter the trap voluntarily, the vast majority of the fish can be assumed to be of hatchery origin, however, adults of natural origin are capable of entering the trap as well.

6.2.1 History.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Klickitat Spring Chinook	H	1988	2002

Broodstock used in the supplementation program since 1988 originated from adults returning to the Klickitat Hatchery trap. No other source of broodstock has been used since that time.

6.2.2 Annual size.

The average annual return to the Klickitat basin is 1,940 (range 533-5,254) for 1977-2003 return years. The broodstock collection goal is 500 fish (50% males, 50% females).

6.2.3 Past and proposed level of natural fish in the broodstock.

Currently, only marked fish are used in broodstock collection. However, with integration of this program, an undetermined number of wild (adipose present) chinook could be used for broodstock beginning in 2006 (2002 brood fish were 100% mass marked).

6.2.4 Genetic or ecological differences.

The original spring chinook program at the Klickitat Hatchery began with adults trapped in the Klickitat River supplemented with eggs from Carson hatchery. Adults are diverted into the hatchery by a low head barrier dam (not a total blockage). Some adults are able to pass the barrier dam and spawn in natural production areas above the hatchery site.

6.2.5 Reasons for choosing.

The broodstock chosen displays morphological and life history traits similar to the natural population. Spring chinook propagated through the program represent the indigenous Klickitat River spring chinook population, which is the target stock for this program.

6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

- Every effort shall be made to promote local adaptation of this spring chinook population and out of basin hatchery transfers of eggs or fish for use as broodstock will only be considered in extreme cases.
- Integrated natural spawners will represent the existing spring chinook run through out the season.
- Hatchery program fish are mass marked.
- Starting in 2006, adult returns will be identifiable as to natural or hatchery origin.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin.
- Holding pond procedures follow IHOT guidelines.
- Adult trapping is monitored daily for incidental of listed steelhead.
- Listed fish are identified and quickly returned to the river.

Section 7. Broodstock Collection

7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Adults for broodstock.

7.2 Collection or sampling design

Adults are captured by a trap that is in operation from early May until mid to late September when spawning is complete. Fish enter the ladder through an opening on the right bank of the river on a volunteer basis. All spring chinook entering the trap may be used as broodstock. Since the river does not have a weir, and all fish enter on a volunteer basis, the majority of the fish entering the trap can be assumed to be of hatchery origin. The trap is a "V" trap design and fish are allowed to pass out of the trap and into the holding pond at least once per day. The fish are visually counted and no handling is necessary.

7.3 Identity.

Spring chinook are identified by run-timing. Since 1988, broodstock used in this program have originated from adults returning to the Klickitat Hatchery trap. .

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults):

500 adults at a 1:1 female to male ratio.

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

Year	Adults		
	Females	Males	Jacks
Planned	250	250	nya
1993	971	811	nya
1994	302	321	nya
1995	288	196	1697
1996	346	204	57
1997	603	226	6
1998	218	102	55
1999	265	210	342
2000	644	321	48
2001	271	138	352

7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

In 2003, 440 female, 122 male and 98 jacks were released upstream of the hatchery. Upstream adult releases occur during June and July when fish are in condition to migrate to the upper reaches of the Klickitat system. Adults are hauled by the Yakama Tribe above Castile Falls at RKm 102 (Draft Klickitat River Sub-basin Planning 2000 Report). Adults released upstream have been checked for CWTs and no fish bearing CWTs are released. Additional surplus fish can be sold or donated to foodbanks, including numerous “micro” jacks (year old males).

7.6 Fish transportation and holding methods.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Concrete	12000	40	60	4	1200

Spring chinook broodstock collected at Klickitat Hatchery trap are held to maturity in the holding pond adjacent to the trap. Monitor pre-spawning mortality (<12%)

7.7 Describe fish health maintenance and sanitation procedures applied.

Up to three erythromycin injections at a dosage of 0.33 cc/10.0 lbs are given to adult spring Chinook.

7.8 Disposition of carcasses.

Due to erythromycin injections, carcasses of spring chinook spawned through the program are buried in an approved upland site (landfill on the hatchery grounds).

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

- Every effort shall be made to promote local adaptation of this spring chinook population and out of basin hatchery transfers of eggs or fish for use as broodstock will only be considered in extreme cases.
- Spring chinook will be collected through out the run time from adults arriving at the hatchery rack.
- Additional natural spring chinook are presumed to spawn up/downstream of the hatchery.
- Broodstock collection and sorting procedures can quickly identify non-target listed fish, if encountered. Fish not used in the program are released immediately.

Section 8. Mating

8.1 Selection method.

Cohorts are utilized from the entire run cycle with males and females available on a given day mated randomly. For the past nine seasons all fish returning to the hatchery trap have been spawned with the exception of 1993 when the total return far exceeded egg take needs.

8.2 Males.

Males are utilized for a 1:1 spawning ratio whenever possible. Up to 2% jacks can be incorporated.

8.3 Fertilization.

Eggs are mixed with milt and water hardened with iodophor at a 1:600 concentration. The carcass of each female spawned is individually numbered and the eggs are kept separate from all other females. Each carcass is sampled for BKD levels and eggs are not co-mingled until the ELISA results are known and segregation on BKD levels is possible.

8.4 Cryopreserved gametes.

Cryopreserved gametes are not used.

8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

- Every effort shall be made to promote local adaptation of this spring chinook population and out of basin hatchery transfers of eggs or fish for use as broodstock will only be considered in extreme cases.
- Listed spring chinook will be collected through out the run time from adults arriving at the hatchery rack.
- Mating cohorts are randomly selected.
- WDFW protocols for population size, egg disinfection, spawning and genetic guidelines followed.

Section 9. Incubation and Rearing.

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

The egg take goal for yearling production 708,000. This indicates an expected survival from egg take to yearling plant of 85%. Survival of green eggs to eyeing is expected at 95% and eyeing to ponding at 98%. In addition, a program goal for up to 1.2 million fingerlings exists, however this program is not managed for in either escapement or egg take goals. (A proposal is being considered by the co-managers which would set the production goals at 600,000 yearlings and 200,000 fingerlings, with escapement and egg take goals set accordingly.)

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.	Fry-fingerling Survival (%)	Rearing Survival Perfor-mance Std.	Fingerling-Smolt Survival (%)
1995	947000	95	97.60	nya	95.10	nya	96.00
1996	1137400	97.50	98.60	nya	97.30	nya	85.85
1997	1837000	98.20	99	nya	97.20	nya	81.11
1998	764200	95.30	98.70	nya	96.20	nya	86.36
1999	880280	96.10	99	nya	97.10	nya	95.22
2000	1582100	96	97.25	nya	98	nya	93.70
2001	1006900	96.59	92.30	nya	98.45	nya	NA
2002	Na						
2003	Na						

9.1.2 Cause for, and disposition of surplus egg takes.

Egg takes are planned according to data/information of historical egg takes at the Kalama Complex. Thus, egg takes are maintained within the plus/minus 5% guideline of the Section 7 permit. BKD and viral sampling (60 fish lots) are conducted over the course of the season. Lots with unacceptable levels of BKD are used for the fingerling program or as may be determined by other protocols involving viral sampling results (IHN). Otherwise, the program broodstock collection goal set forth in the annual brood document usually prevents surpluses.

9.1.3 Loading densities applied during incubation.

FAL vertical incubators are used for eyeing and hatching spring chinook eggs at Klickitat Hatchery. Eggs are loaded at the rate of one females' eggs per tray to eyeing, and 6,500 eggs per tray for hatching. Average egg size is approximately 1500 eggs per pound, with a great deal of variation expected.

9.1.4 Incubation conditions.

Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities. Harmful silt and sediment is cleaned from incubation systems regularly while eggs are monitored to determine fertilization and mortality. Incubation water is from a spring source and temperature is monitored by thermograph and recorded and temperature units (TU) are tracked for embryonic development. Dissolved oxygen content is monitored and have been at acceptable levels of

saturation with a minimum criteria of 8 parts per million (ppm). When using artificial substrate, vexar or bio-rings, egg densities within incubation units are reduced by 10%.

9.1.5 Ponding.

Spring chinook fry are ponded in up to 12 raceways and reared from December through May of the following year. Fry are ponded when: a visual inspection of the amount of yolk sac remaining with the yolk slit closed to approximately 1 millimeter wide (approximately 1600 TU's) or based on (95% yolk absorption) KD factor. At this time fry are transferred to the appropriate starter raceway (See HGMP Section 5.5 for raceway specifications) usually during the last two weeks of January.

9.1.6 Fish health maintenance and monitoring.

IHOT and WDFW fish health guidelines are followed. Hatchery staff conducts daily inspection, visual monitoring and sampling from eye, fry fingerling and sub-yearling stages. As soon as potential problems are seen, these concerns are immediately communicated to the WDFW fish health specialist. In regular monitoring, Fish Health Specialists conduct inspections monthly. Potential problems are managed promptly to limit mortality and reduce possible disease transmission. See 7.2 above.

9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

IHOT and WDFW fish health guidelines followed. Eggs in the Klickitat program are on spring water to maximize egg survival and minimize loss from disease. All eggs brought to the facility (for other programs) are surface-disinfected with iodophor (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water. Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens. The incubation room units are protected by separate low water alarms.

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Fry-fingerling Survival (%)	Fingerling-Smolt Survival (%)
1995	947000	95	97.60	95.10	96.00
1996	1137400	97.50	98.60	97.30	85.85
1997	1837000	98.20	99	97.20	81.11
1998	764200	95.30	98.70	96.20	86.36
1999	880280	96.10	99	97.10	95.22
2000	1582100	96	97.25	98	93.70
2001	1006900	96.59	92.30	98.45	NA
2002	Na				
2003	Na				

9.2.2 Density and loading criteria (goals and actual levels).

The juvenile rearing density and loading guidelines used at the facility are based on: standardized agency guidelines, life-stage specific survival studies conducted at other facilities and staff experience. IHOT standards are followed for: water quality, alarm systems, predator control measures to provide the necessary security for the cultured stock, and monitoring of loading and density.

9.2.3 Fish rearing conditions.

Fish are reared in ponds 8,9 and 10. After subyearlings have been transferred out for release in the upper watershed, production for the yearling cycle takes place in ponds 22, 24 and 26 until release. Temperature, dissolved oxygen and pond turn over rate are monitored. IHOT standards are followed for: water quality, alarm systems, predator control measures (netting) to provide the necessary security for the cultured stock, loading and density. Settleable solids, unused feed and feces are removed regularly to ensure proper cleanliness of rearing containers. Water temperature regime are the same as in natural environment.

9.2.4 Indicate biweekly or monthly fish growth information (average program performance), including length, weight, and condition factor data collected during rearing, if available.

The daily amount fed is determined by the number of fish in the population and sample weight. Feed is therefore applied at a daily rate ranging from 2.0% of the total population weight per day (fry and small fingerlings) to 0.7% of the total population weight per day (larger fingerlings and smolts). The expected feed conversion efficiency rate is 1.2.

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate	Hepatosomatic Index	Body Moisture Content
06.01	92	52	1.128	2125	nya	nya
07.01	100	41	1.092	4525	nya	nya
08.01	114	29	1.056	4579	nya	nya
09.01	114	24	1.316	9049	nya	nya
10.01	131	17	1.207	7791	nya	nya
11.01	136	13	1.213	7262	nya	nya
12.01	165	8	1.197	14483	nya	nya
01.02	172	7	1.313	17537	nya	nya
02.02	162	7	1.455	566	nya	nya

9.2.5 Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate	Hepatosomatic Index	Body Moisture Content
06.01	92	52	1.128	2125	nya	nya
07.01	100	41	1.092	4525	nya	nya
08.01	114	29	1.056	4579	nya	nya
09.01	114	24	1.316	9049	nya	nya
10.01	131	17	1.207	7791	nya	nya
11.01	136	13	1.213	7262	nya	nya
12.01	165	8	1.197	14483	nya	nya
01.02	172	7	1.313	17537	nya	nya
02.02	162	7	1.455	566	nya	nya

9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
1: 1/28/02-2/25/02	Ewos Micro #2	8	2	0.02	0.52
2: 2/11/02-5/13/02	Ewos Pacific 1.2mm	2	1.80	0.02	0.60
3: 5/13/02-9/10/02	Ewos Pacific 1.5mm	1	0.70	0.02	0.55
4: 12/12/01-1/28/02	BDS #3	8	2	0.005	0.70
5: 1/28/02-2/18/02	BDG 1.0mm	4	1.90	0.01	0.72
6: 2/18/02-3/18/02	BMG 1.3 mm	1	1.80	0.02	1.35
7: 3/18/02-5/20/02	BGM 1.5mm	1	1.30	0.03	0.96
8: 5/20/02-7/29/02	BMG 2.5mm	1	1.18	0.02	1.35
9: 7/29/02-9/2/02	BMG 2.5mm	1	1.55	0.04	0.82

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

Fish Health Monitoring	Policy guidance includes: *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995). A Fish Health Specialist inspects fish programs at Klickitat Complex monthly and checks both healthy and if present, symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.
Disease Treatment	As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Yearling spring chinook receive one prophylactic treatment of pills top coated with erythromycin. Any pond mortality is collected and disposed of at a landfill. Fish health and or treatment reports are kept on file.
Sanitation	All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Footbaths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

The migratory state of the release population is determined by fish behavior. Aggressive screen and intake crowding, swarming against sloped pond sides, leaner condition factors, a more silvery physical appearance and loose scales during feeding events are signs of smolt development. Multiple smolt events can also be triggered by environmental cues including daylight increase, a spike in the water temperature and spring freshets. ATPase activity is not measured.

9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

None.

9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

- Limit out of basin transfers of fish or eggs for use as broodstock, except in rare circumstances.
- At least 500 adults are available in the population.
- Listed spring chinook will be collected through out the run time from adults arriving at the hatchery rack.
- Protocols for population size, fish health disinfection and genetic guidelines followed.
- Eggs water hardened in iodophor (1:600).
- Multiple incubation and rearing units are used.
- Staff is available 24/7 to respond to emergencies.
- WDFW, IHOT guidelines are followed for rearing, release and fish health parameters.

Section 10. Release

10.1 Proposed fish release levels.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Fingerling	200000	60	May thru August	Klickitat	102	Klickitat	Columbia Gorge
Yearling	600000	14 FBD	03/01/02	Klickitat	68	Klickitat	Columbia Gorge

10.2 Specific location(s) of proposed release(s).

Yearlings are volitionally released from Ponds 24-26 at the hatchery (RKm 68). Fingerlings are hauled and planted at a number of locations in the upper Klickitat River (RKm 102) by the Yakama Tribe.

10.3 Actual numbers and sizes of fish released by age class through the program.

In 1997, an additional fry release of 854,700 (1106 fpp) were released from 12/5 – 12/29.

	Fingerling Release			Yearling Release		
Release Year	No.	Date (MM/DD)	Avg Size (fpp)	No.	Date (MM/DD)	Avg Size (fpp)
1996	223000	5/28-5/29	54	610000	2/8-2/9;3/1-3/16	6
1997	382500	5/27-5/29	49.5	5806000	3/1-3/15	7
1998	343380	5/6, 5/7, 6/30	77	584500	3/2-3/12	7
1999	40600	5/11	81	538000	3/1, 3/2	7.5
2000	190842	5/2,5/3,8/9,8/17	63.6	562000	3/1-3/10, 3/20-3/31	6.4
2001	252098	5/13, 7/22	51.4	615000	3/7-3/9	7.7
2002	223298	5/13	51.4	605000	3/8-3/10	7.7
2003	286,400	5/6,8/6	71/36	607500	3/5-3/8	8.0

10.4 Actual dates of release and description of release protocols.

Various release strategies are used to ensure that fish migrate from the hatchery with the least amount of interaction with native populations. Spring chinook yearling smolts are volitionally released into the Klickitat River adjacent to the hatchery from the hatchery rearing ponds in mid March. Sub-yearlings are trucked to the upper river. See section 10.3 above also.

10.5 Fish transportation procedures, if applicable.

For the sub-yearlings trucked to the upriver sites, the Yakama Tribe staff can use 2500 and 2200 gallon tanker trucks that are equipped with re-circulation and oxygen.

10.6 Acclimation procedures (*methods applied and length of time*).

Spring chinook are acclimated to the release site through rearing on spring water supplied by gravity feed. River water is added and is the main water source for several weeks prior to release

to ensure strong homing to the hatchery, thus reducing the stray rate to upper Columbia watersheds. River water is introduced to the rearing pond by pumps. Yearling smolts have been reared approximately15 months prior to release in mid March, and sub-yearling smolts have been reared approximately 4 months prior to release. It is assumed that additional imprinting will continue to take place as the smolts migrate downstream.

10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

A proportion of each years release of spring chinook from Klickitat Hatchery receives an adipose clip-coded wire tag marking combination. Approximately 17% of the annual release of 600,000 smolts released at the hatchery have received this marking combination. The remaining yearling production and all the fingerlings release above the hatchery (up to 220,000) are adipose clipped only.

10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels

Egg takes are planned according to data/information of historical egg takes at the Klickitat Hatchery. Thus, egg take and production are maintained within the plus/minus 5% guideline. For unforeseen events, the Hatchery Manager would contact the Complex Manager who would contact the appropriate WDFW Regional Manager to apprise him/her of the situation. Regional Manager would consult with appropriate regional co-managers/NOAA to get recommendation for fish disposition. The Hatchery Complex Manager would instruct hatchery to implement recommendation.

10.9 Fish health certification procedures applied pre-release.

Prior to release, fish are given a fish health exam. Whenever abnormal behavior or mortality is observed, staff conducts the Area Fish Health Specialist. The fish specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers Fish Disease Control Policy. All fish are examined for the presence of “reportable pathogens” as defined in the PNFHPC disease control guidelines, within 1 to 3 weeks prior to release.

10.10 Emergency release procedures in response to flooding or water system failure.

Emergency procedures and disposition of fish would adhere to the protocols and procedures set forth in the Program Section 7 Permit. If the program is threatened by ecological or mechanical events, the Complex manager would contact and inform regional management of the situation. Based on a determination of a partial or complete emergency release of program fish, if an on-station emergency release was authorized personnel would pull screens and sumps and fish would be forced released into the Klickitat River. No release of fish will occur without a review by WDFW Fish Management and a risk assessment is performed.

In the event of a water system failure, screens would be pulled to allow fish to exit the ponds or in some cases they can be transferred into other rearing vessels to prevent an emergency release. WDFW also has emergency response procedures for providing back-up pumps, transport trucks, etc. in cases of emergency. In cases of severe flooding the screens are not pulled. Past experience has shown that the fish tend to lay on the bottom of the pond during flooding events and only those that are inadvertently swept out are able to leave.

10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

- The production and release of only smolts through fish culture and volitional release practices fosters rapid seaward migration with minimal rearing of delay in the rivers, limiting interactions with naturally produced steelhead juveniles.
- WDFW uses acclimation and release of yearling smolts in lower river reaches where possible, this in an area below known wild fish spawning and rearing habitat in the upper Klickitat River.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to access, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW fish health and operational concerns for Klickitat Hatchery programs are communicated to WDFW Region 5 staff for risk management or needed treatment. See also section 9.7.

Section 11. Monitoring and Evaluation of Performance Indicators

11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

The Spring Chinook monitoring program proposed in Objectives SC3-SC6 will enable the project to determine if it is meeting the overall goal. See the draft Klickitat Subbasin Master Plan (contact Bill Sharp, Yakama Nation) for monitoring and evaluation program details.

While improving the fitness of the target stock, increase the number of returning spring chinook adults that result from both artificial and natural production (Ferguson and Sharp 2002), which will serve to increase harvest. Consistent with the regional goal of doubling salmon returns (NPPC 1994), the goal is to at least double the annual river mouth return, harvest, and escapement from current levels. The overall goal for spring chinook, as well as the objectives and strategies, were developed in recognition of the importance of spring chinook to the Yakama Nation. The Lyle Falls dipnet fishery has been important to Indian people since before the arrival of the first white settlers. With the inundation of Celilo Falls, it holds special significance as the one remaining site where Yakama fishers have the opportunity to fish year-round using traditional dipnet and jumpnet gears. The Klickitat provides one of the few opportunities for spring chinook harvest by tribal members while other Columbia Basin spring chinook stocks remain at low levels of abundance (Sharp 2000). The objectives and strategies also recognize that, because spring chinook were present historically in the Klickitat basin, habitat improvements and increases in hatchery production using supplementation/recovery strategies have the potential to increase spring chinook natural production and distribution throughout a larger area. Ongoing activities described in Appendix B will improve access to available habitat in the upper Klickitat subbasin. Other passage and habitat improvements proposed in Chapter 10 would increase the amount of available habitat. Increasing the number of spring chinook released, improving the quality of fish released, and releasing them from natural rearing areas are expected to result in increased returns to fisheries and to natural escapement areas. The spring chinook program in the Klickitat basin currently depends upon artificial production at the Klickitat Hatchery. The proposals to change broodstock collection methods and locations are designed to meet the goal of making hatchery releases more compatible with the natural environment, thereby enhancing natural production and increasing the contribution of natural origin adult recruits (NORs) to the fisheries. YN biologists believe that, historically, spring chinook were able to negotiate Castile Falls and use habitat in the upper basin (see section 3.1.1). Proposed broodstock collection facilities at Lyle Falls would provide broodstock collection opportunities throughout their run, whereas now, only those that return to the hatchery are collected. Proposed new facilities at Castile Falls would allow collection of naturally produced fish that have adapted to the conditions in the upper basin, which theoretically could increase natural production in the upper reaches of the river. Advocates of hatchery reform recommend using naturally produced fish as broodstock whenever possible to minimize risks.

11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

None are committed through Mitchell Act funding. Through a multi-species BPA funded M&E program, some coho M&E functions are performed.

11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Spawning ground surveys and biological sampling occurring during the recovery will employ measures to ensure that effects on the survival of the listed chinook salmon population are insignificant. Salmon redds and live spawning fish will not be disturbed during surveys and sampling.

Section 12. Research

12.1 Objective or purpose.

In prior years the following monitoring has been done, it is unknown at this time if these will be continued:

1) Measure fecundity of Spring Chinook salmon at Klickitat Hatchery each year to determine temporal changes.

2) Compare these data to calculated fecundities obtained from hatchery records

3) Compare these data to data obtained at other Columbia Basin hatcheries.

12.2 Cooperating and funding agencies.

NOAA, WDFW

12.3 Principle investigator or project supervisor and staff.

Jim Byrne, WDFW, 600 Capitol Way N. Olympia, WA**.**

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

12.6 Dates or time periods in which research activity occurs.

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8 Expected type and effects of take and potential for injury or mortality.

12.9 Level of take of listed fish: number of range or fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "Take tables"

12.10 Alternative methods to achieve project objects.

12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities.

Section 13. Attachments and Citations

13.1 Attachments and Citations

1.) Becker, C.D. 1973. Food and growth parameters of juvenile Chinook salmon, *Oncorhynchus tshawytscha*, in central Columbia River. Fish. Bull. 71: 387-400.

2.) Berg, R. and D. Nelson. 2003. Mitchell Act hatcheries intake and fish passage study report. Washington Dept. of Fish and Wildlife. Olympia, Wa.

3.) Bosch,W. and B. Sharp, W. Conley, J. Zendt., April 2004. Klickitat Subbasin Anadromous Plan Yakama Nation in cooperation with Washington Department of Fish and Wildlife, Toppenish, Washington

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Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Take Table 1. Estimated listed salmonid take levels by hatchery activity.

Steelhead

ESU/Population	Middle Columbia River Steelhead
Activity	Klickitat Hatchery Spring Chinook Program
Location of hatchery activity	Klickitat R. Hatchery
Dates of activity	May – September
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya	nya	nya
Other take (indirect, unintentional) (h)	nya	unk	nya	nya

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category

Take Table 1. Estimated listed salmonid take levels by hatchery activity.

Bull Trout

ESU/Population	Middle Columbia River Steelhead
Activity	Klickitat Hatchery Spring Chinook Program
Location of hatchery activity	Klickitat R. Hatchery
Dates of activity	May – September
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya	nya	nya
Other take (indirect, unintentional) (h)	nya	unk	nya	nya

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category